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| Work Task E6: | Unit #1 (Cottonwood Genetics, Mass Planting Techniques, Seed Feasibility Study), Cibola National Wildlife Refuge | |
| Partners: | Northern Arizona University (NAU) Cibola National Wildlife Refuge (CNWR) Bureau of Reclamation (Reclamation) | |
| Points of Contact: | Genetics Mass Planting Seeding | Gregg Garnett, LC-2455, (702) 293-8644 Gail Iglitz, LC-2459, (702) 293-8138 Barbara Raulston, LC-2543, (702) 293-8788 |
| Purpose: | <p>Restoration research projects which have the potential for future habitat development.</p> <p><i>Cottonwood Genetics.</i> Research project to investigate the influence of genetic diversity in Fremont cottonwood on community diversity in the context of habitat restoration. One result of this study will be to determine the genetics of the existing stands of cottonwoods along the lower Colorado River (LCR). Concerns have been raised over the introduction of genetic strains of cottonwoods</p> <p><i>Mass Planting Demonstration.</i> Evaluate mass planting techniques for cottonwood and willow using mechanized planting equipment to increase the cost effectiveness of future habitat creation projects.</p> <p><i>Seed Feasibility Study.</i> The purpose of this study is determine the best methods to establish native riparian habitat from seed consisting of cottonwood, willow, and other native groundcovers and shrubs to increase the cost effectiveness of future habitat creation projects.</p> | |
| Conservation Measures: | Develop techniques in support of all covered species habitat creation requirements and a potential site for creation of habitat. | |
| Long-Term Goal: | <p><i>Cottonwood Genetics.</i> Use the information gained from this study to select trees with genetically superior traits with respect to growth, reproduction, survival, and habitat quality they influence. The experimental garden will supply stock of known genetic diversity and origin for future restoration efforts. The experimental garden, when mature, will add to the site habitat structural mosaic and may serve as suitable habitat for yellow-billed cuckoo.</p> <p><i>Mass Planting Demonstration.</i> Restoration research to reduce the cost of habitat creation and development of southwestern willow flycatcher and yellow billed cuckoo habitat.</p> | |

Seed Feasibility Study. Restoration research to reduce the cost of habitat creation and development of southwestern willow flycatcher and yellow billed cuckoo habitat.

Location: 120 acres of active alfalfa fields within Unit #1 on CNWR.

FY05 Estimate: \$492,000 will Fund in-house staff and contract services for the following projects.

\$50,000 for expansion of experimental plots design to meet Reclamation requests for the cooperative agreement.

\$350,000 for in-house staff and contractual services in support of the mass planting demonstrations.

\$140,000 for in-house staff and contractual services in support of the seeding demonstrations.

Project Description: *Cottonwood Genetics.* Information is lacking regarding the relative levels of genetic diversity within the remaining cottonwoods along the LCR and the impact of this genetic diversity as it pertains to community structures and ultimately, wildlife diversity within restoration sites. In an effort to increase knowledge and success in creating functional wildlife habitat, Reclamation's restoration group solicited the scientific community for proposals to investigate these relationships. NAU was awarded a cooperative agreement and contributed matching funds to undertake these investigations. Their project is twofold and includes: (1) the identification of genetic stocks of Fremont cottonwoods that possess traits including superior growth, reproduction, and survival in a typical restoration site, and (2), the identification of stocks of Fremont cottonwood trees that support diverse biological communities, including communities that sustain wildlife species. The first part of the project includes genetic screening of tissues collected from stands of Fremont cottonwood trees across the southwestern U.S. The second involves creating an experimental garden to propagate representatives of the collected genetic stock and monitor the expressions of these different genotypes. Cibola National Wildlife Refuge offered approximately 40 acres (in two roughly 20-acres fields) of agricultural land with water and irrigation infrastructure for NAU to establish their experimental cottonwood garden.

Mass Planting Demonstration. Reclamation is demonstrating automated mass-planting techniques using native riparian species. This project represents a combination of research and habitat creation. The intent is to investigate the feasibility and effectiveness of using this technique in restoration of agricultural fields. The cost benefit of this method will be evaluated along with its effectiveness and appropriateness in the creation of native habitat to meet LCR MSCP goals. The technique involves mechanized, rapid, dense planting of 4,500 seedlings per acre to inhibit growth of non-native plant species and to achieve dense growth of native tree species. Eventually up to 36 acres of cottonwood/willow habitat may be created.

A contract for the demonstration of mass planting of cottonwood and willow utilizing commercially available equipment was competed and awarded to two contractors: Greenheart Farms, Arroyo Grande, California and Bluejack Nurseries, Brawley, California. Each contractor detailed a significantly diverse approach for mass planting cottonwood and willow trees. The intent is to demonstrate and compare each of these techniques. Each technique will be evaluated for the effectiveness of creating quality habitat and cost benefit. Currently, these methods are being utilized in the agriculture industry to produce high quality fruits and vegetables at a cost effective approach.

Restoration and research activities will take place on existing alfalfa fields for the mass planting of cottonwood and willow. The FWS currently employs the services Mr. Ron Swan as their co-op farmer to grow crops and deliver water to the fields. The irrigation of the mass planting fields will be incorporated with the current water schedule. A purchase request has been generated for water delivery services and crop loss.

Seed Feasibility Study. Reclamation's goal for this study is to determine the best method to produce large acreages composed of a dense mosaic of cottonwood and willow, interspersed with native groundcovers and shrubs, with as little saltcedar as possible. Using seeds collected locally may be less labor intensive and will better preserve the genetic diversity and integrity of the riparian vegetation found on the LCR. Deliverables under this contract will include: 1) Determination and documentation of best protocols for collection, care, storage, and treatment of cottonwood and willow seeds from the LCR, 2) Determination and documentation of a combination of planting techniques using seed that results in cottonwood and willow stands with densities high enough to shade-out saltcedar and other non-native vegetation, and 3) Determination and documentation of best methods to produce a

mosaic of riparian vegetation i.e. native shrub and groundcover components within patches of densely growing cottonwood and willow.

**Accomplishments
/Conclusions to date:**

Cottonwood Genetics. NAU researchers have collected leaf tissue from 600 Fremont cottonwood trees distributed in five states. They have isolated DNA from approximately 250 trees and performed genetic screening and analysis of DNA. Preliminary results indicate that genetic diversity is high in Fremont cottonwood. Selection and collection of genetic stock for experimental garden is currently ongoing.

Mass Planting Demonstration. Contracts were awarded to Greenheart and Bluejack Nurseries. Planting is scheduled for spring of 2005.

Seed Feasibility Study. The Statement of Work and Request for Proposals are in progress, intended for award in 2005